

Attorney Docket No.: FMCE-P073

a recessed undercut as taught by Amancharla to ensure that the seal is secured and locked in position within the bore.

However, the Examiner's understanding of Amancharla is incorrect.

Contrary to the Examiner's understanding, Amancharla does not disclose a seal which is expandable into a recessed undercut in a bore. The recessed undercut to which the Examiner refers in paragraph 2 of the Office Action is not a recessed sealing surface. Rather, as shown more clearly in Figure 10B, the recess 22d is part of a locking profile which is formed in a landing nipple 22. In addition, the locking profile is not engaged by a seal, but rather by a plurality of locking keys 85 which are supported on an expandable plug 23 (see column 4, lines 34-47). Moreover, although the plug 23 also supports an external annular seal 100, this seal does not engage a recessed sealing surface when it is expanded (see Figure 7B).

Thus, even assuming *arguendo* that the combination of Amancharla with Rogen is proper, such a combination does not teach a seal component which is comprised of a shape memory alloy and which is expandable into sealing engagement with a recessed sealing surface upon being heated, as is required by claim 1. Therefore, claim 1 is patentable over Rogen and Amancharla under 35 U.S.C. 103(a).

Furthermore, since claims 3, 4, 7-9, 14-18 and 20 depend from claim 1, these claims are also patentable over Rogen and Amancharla under 35 U.S.C. 103(a) for the reasons stated above.

Attorney Docket No.: FMCE-P073

Claims 1, 3, 7-9, 14, 15, 18 and 20-27 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Duncan (U.S. Patent No. 5,735,344) in view of Rogen. The Examiner asserts that Duncan discloses a seal which is configured as required by claims 21 and 25 of the present application, which engages a bore that has an undercut recessed sealing surface as required by claims 1, 21 and 25, and which is expanded by an energizing mandrel as required by claim 25. Although the Examiner concedes that neither the seal nor the energizing mandrel in Duncan is comprised of a shape memory alloy, the Examiner asserts that Rogen teaches that both a seal and an energizing mandrel can be made of a shape memory alloy. Therefore, the Examiner concludes that it would have been obvious for one of ordinary skill in the art to make Duncan's seal and energizing mandrel from a shape memory alloy as taught by Rogen so that the seal can be recovered and reused.

However, the Examiner's understanding of Duncan is incorrect. Contrary to the Examiner's understanding, this patent does not disclose a recessed sealing surface which is undercut into a bore. As shown best in Figure 2 of Duncan, although the seal 29 is configured similarly to that required by claims 21 and 25 of the present application, this seal does not engage a recessed sealing surface in either the wellhead 11 or the tubing hanger 14. Rather, the interior surface 15 of the wellhead and the smaller diameter exterior surface 27 of the tubing hanger 14 are merely *stepped*.

Moreover, a *stepped* sealing surface is not equivalent to a *recessed* sealing surface. In the context of the present application, a recessed sealing

Attorney Docket No.: FMCE-P073

surface comprises a diameter which is larger than the diameter of the bore immediately above *and* below the recess. Consequently, the recessed sealing surface enjoys a relatively greater degree of protection against accidental damage and erosion. This is clearly not the case with the stepped surfaces 15 and 27 of Duncan, a fact which Duncan readily admits (see column 4, lines 35-41).

Thus, even assuming *arguendo* that the combination of Rogan with Duncan is proper, such a combination does not teach a seal component which is expandable into sealing engagement with a recessed sealing surface that is undercut in a bore, as is required by each of independent claims 1, 21 and 25. Therefore, these claims are patentable over Duncan and Rogan under 35 U.S.C. 103(a).

Furthermore, since claims 3, 7-9, 14, 15, 18, 20, 22-24, 26 and 27 depend from claims 1, 21 and 25, these claims are also patentable over Duncan and Rogan under 35 U.S.C. 103(a) for the reasons stated above.

The prior art made of record but not relied upon has been considered but is not believed to be pertinent to the patentability of the present application.

In light of the foregoing, claims 1, 3, 4, 7-9, 14-18 and 20-27 are submitted as allowable. Favorable action is solicited.

Respectfully submitted,



Henry C. Query, Jr.  
Reg. No. 35,650  
(630) 260-8093

Date: September 20, 2004